Agricultural Production and Economic Activity in Chinena Village: Economic Significance of Dambo Use

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—— Economical Significance of Dambo Use ——

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1 Introduction

From the result of our first research conducted in August 1993, it was presumed that dambo use for agricultural production has had a great impact on the economic activity including agricultural production in Chinena village. Economical significance of dambo use in Chinena village is summarized into the following three points.

(a) The rainy season is once a year in Chinena village. In the case of rainfed upland agriculture, crops are normally grown once a year during the rainy season. Due to this reason, agricultural income will be confined to the income from selling crops harvested during or after the rainy season once a year. Even during the dry season, it is possible to grow vegetables sprinkling water drawn up a well in dambo where an underground water level is high. Agricultural income during the dry season is very important to household economy and farm management, adding to the income from the rainy season.

(b) It has been definitely shown by the results of soil analysis that the original soil fertility in Chinena land is very low. Many farmers buy chemical fertilizer and apply it to the agricultural land. It is supposed that farmers who can buy and use chemical fertilizer get additional income gained in selling vegetables, particularly tomatoes on dambo fields during the dry season.

(c) It is also supposed that high income gained from agricultural production on dambo fields stimulates economic activity, particularly of non-agriculture in Chinena village, and expands the size of household economy.

The above-mentioned three points are based on my supposition, however, I could not get any actual data to prove them in the last research of 1994, so I use the data

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collected in 1993.

I collected the data and information on the size of agricultural income, use of capital, agricultural credit, employment of agricultural labor and non-farming economic activity by household head and his wife in the second research of August 1993. I analyse the economic significance of dambo use for farming in Chinena village using these data from the view points of the following.

(a) The component ratio of the income from on upland and on dambo, particular vegetables in the total agricultural income.

(b) The relationship between agricultural income and purchased quantity of chemical fertilizer.

(c) The economic effects of dambo farming to the village economy.

2 Outline of the 1993 research

A sample number was 76 farm households. The total number of household interviewed in Chinena village was 83 in August 1992, but in fact there was a few

Table 1 Tribe composition

No.	Name of tribe	No.	%
1	Lenje	19	25.0
2	Tonga	12	15.8
3	Tshangani	12	15.8
4	Chewa	6	7.9
5	Shona	5	6.6
6	Bemba	3	3.9
7	Lala	3	3.9
8	Kalanga	2	2.6
9	Lozi	2	2.6
10	Namwanga	2	2.6
11	Ngoni	2	2.6
12	Chikunda	1	1.3
13	Ila	1	1.3
14	Kalanga/Shona	1	1.3
15	Lamba	1	1.3
16	Malila	1	1.3
17	Nsebga	1	1.3
18	Nyoka	1	1.3
19	Sala	1	1.3
		76	100.0

Source: Fieled study of 1992

households which I did not interviewed. A number of household had changed due to a) migration, and b) son's independence from his father, in the past one year. It is estimated that there were about 100 households in Chinena village as of August 1993.

I interviewed household head using questionnaire to get information. In the case of the household where the head was not at home, his wife or children was interviewed.

Table 1 shows the tribe composition of 76 household heads in Chinena. Lenje which is the name of Headman's tribe accounts for 25 percent of all household heads. Following it, Tonga and Tshungani hold the second positions (15.8 percent each). There are 18 tribes of household head in total.

3 Use of dambo fields

The people of Chinena village have distinguished in their language between upland and dambo. They call upland Munda (pl. Myunda), and dambo Cinyika (pl. Shiniyika)

Table 2 Parcal number of dambo

Parcel No.	Household No.	%	Total Parcels	%
3	1	1.3	3	3.8
2	9	11.8	18	22.5
1	59	77.6	59	73.8
0	7	9.2	0	0.0
	76	100.0	80	100.0

Source: Field study of 1992.

Table 3 Dambo site

Name of dambo	Parcel No.	%	Household[1] No.	%
Headman's	25	31.3	22	28.2
Kanchoncho	29	36.3	25	32.1
Lubulanski	10	12.5	9	11.5
Lwamabwe	5	6.3	5	6.4
— [2]	11	13.8	10	12.8
None	0	0.0	7	9.0
Total	80	100.0	78	100.0

[1] Two households have two dambos where the site is different.
[2] No information about the site.
Source: Field study of 1992.

in their language. dambo field is adjacent to upland field. It is difficult to judge a boundary line. What is a criterion to distinguish actually between dambo field and upland field? It seems that dambo is a flooded area during the rainy season as I see it. But a boundary ought to shift because an annual rainfall fluctuates each year.

Table 2 shows a number of dambo parcel per household. About 10 percent of 76 households do not have dambo field. This number is mostly same as the result of the last research (12.5 percent). About eighty percent of the total household uses only one parcel of dambo. What differs from the result of the last research of 1993 is the fact that household using three parcels of dambo is only one while four households in the last. It is observed that the right of dambo using is transferred among friends and relatives.

There are four damboes (Headmans, Kanchoncho, Lubulanski, and Lwamabwe) in Chinena village. Table 3 shows the use of dambo by household. Although there is no information on the site of 11 dambo parcels which are used in the total 10 households, most of households utilize dambo field in Headmans and Kanchoncho.

4 Agricultural production and dambo use

4.1. Maize production

Staple food is maize in Chinena village. Maize production is very important to Chinena people as not only basic food but also cash crop. Harvest of maize in 1992/93 was normal while it is 1991/92 was very poor because of rainfall shortage. All of farmers had already harvested maize at the time of our research. But they did not sell maize except three farmers.

In Zambia, the liberalization of maize marketing has just started in 1993. Private trader can enter into the maize buying activity. The floor price of maize fixed by the government was 5,000 kwacha (1 US $=500 k) per bag (90 kg). But the government was in the face of the fund shortage for maize buying, and could not buy enough maize to distribute to urban people. Thus some rural trader was buying maize at lower price than the floor price, according to the local news paper.

Furthermore, sever inflation has attacked to Zambian economy. The increases in

Table 4 Estimated harvest and consumption of maize in 53 households

(90 kg/bag)

	Harvest	Consumption	Surplus
Total	2,741	988	1,753
Mean	51.7	18.6	33.1

Source: Field study of 1992.

Table 5 Estimated surplus production of maize

	Surplus	Equal (Even)	Deficit	Total
Number of household	28	10	15	53
%	52.8	18.9	28.3	100.0

Surce: Field study of 1992.

Table 6 Agricultural income on upland and dambo between Sept. 1992 and Aug. 1993

	Total (k)	%	% of total	Household	Average (k)
Upland[1]					
Cotton	56,100	0.5		2	28,050
Tomato	9,213,850	75.8		52	177,189
Sunflower	62,450	0.5		3	20,817
Watermelon	2,057,100	16.9		26	79,119
Groundnut	462,000	3.8		7	66,000
Sorghum	56,000	0.5		1	56,000
Popcorn	222,500	1.8		4	55.625
Finger millet	12,000	0.1		1	12,000
Sweet potato	6,000	0.0		1	6,000
Sub-total	12,148,000	100.0	58.8	58	209,448
Dambo					
Maize[2]	361,950	4.3		2	180,975
Tomato	6,275,550	73.7		41	153,062
Rape	800,950	9.4		15	53,397
Watermelon	751,000	8.8		9	83,444
Popcorn	75,000	0.9		1	75,000
Sugercane	250,000	2.9		1	250,000
Sub-total	8,514,450	100.0	41.2	46	185,097
Total	20,662,450		100.0	66	313,067

[1] Two farmers sold several bags of maize before interview. But the income from maize was not included because most of farmers have not sold maize yet.

[2] Maize harvested on dambo was sold as raw maize.

Source: Field study of 1992 and 1993.

consumer prices was 191 percent in 1992, according to IMF data. Zambia was eighth among the first 10 countries with most dramatic inflation. The floor prices of maize was lower than the increase rate of consumer prices.

Table 4 shows the estimated number of harvested maize bags. Chinena has considerable surplus production of maize. The surplus is an average 33 bags per household. Table 5 shows that how many households were in surplus, even or deficit. About 50 percent of 53 households was in surplus, 20 percent in even, and 30 percent in deficit. As mentioned already, soil fertility of Chinena village is very poor. The use of chemical fertilizer and improved seed, however, would bring about the surplus production of maize in about half of the interviewed households.

4.2. Amount of agricultural production

Table 6 shows the estimated amount of agricultural production by upland and dambo. Figures on dambo is calculated from the data collected in 1993. It shows that the amount of agricultural production on upland (60 percent) was higher than it on dambo. Maize on upland, which was expected to sell, is excluded from the amount of agricultural production. If the amount of maize is added to the total amount, the share of dambo will be reduced moreover.

Among crops planted on upland, tomato and watermelon have a large share of the total amount. A number of households which sold tomato was far more than the other crops. Even on dambo, the amount of tomato production for sale has a large share (74 percent) of the total.

Table 7 shows the distribution of agricultural income. The amount of dambo maize which might be sold is not included in the agricultural income. About five percent of 75 households got one million of agricultural income or over. But on the other hand, a household which did not get any agricultural income is 12 percent of 75

Table 7 Agricultural income distribution

Income (k)	Upland Household	%	Dambo Household	%	Total agri. Household	income %
1,000,000<	2	2.7	1	1.5	4	5.3
800,000~999,999	0	0.0	1	1.5	1	1.3
500,000~799,999	6	8.1	0	0.0	9	12.0
300,000~499,999	6	8.1	4	5.9	8	10.7
100,000~299,999	18	24.3	12	17.6	17	22.7
1,000~99,999	26	35.1	28	41.2	27	36.0
0~ 999	16	21.6	22	32.4	9	12.0
Total	74	100.0	68	100.0	75	100.0

Source: Field study of 1992.

households. The income difference among households is very large. Only two of six households which got no agricultural income have surplus production of dambo maize. The considerable increase of agricultural income can not be expected even if dambo maize is sold.

However, most of households which have no agricultural income are new comers to Chinena village during the last one year and the old aged households. No agricultural income may not be a serious social problem because the new comers will be able to get income and the old aged people will receive assistance from their children.

4.3. Possession of asset and livestock

Table 8 shows the possession of asset. It is noteworthy that many farmers have ploughs, sprayers and oxen carts. It relates to the high agricultural income in Chinena village. There are three households which have a car. Two households out of three bought used cars within the last one year, but the cars were broken down. Car and oxen cart are very important transport means to carry farm products and inputs, and to get non-agricultural income.

Table 8 Possession of assets

(76 households)

Items	Households	%
Car	3	3.9
Oxen carts	24	31.0
Plough	49	64.5
Sprayer	35	46.1
Engine pump	2	2.6
Tractor	1	1.3
Milling machine	1	1.3
Harrow	3	3.9

Table 9 Numbers of livestock keeping

	Households	%	Total numbers	Average
Cattle	52/75	69.3	346	6.7
Oxen	44/75	58.7	129	2.9
Cow	44/75	58.7	217	4.9
Goat	16/76	21.2	125	7.8
Chicken	58/75	77.3	1,127	19.4
Duck	9/76	11.8	40	4.4
Genephael	10/76	13.2	36	3.6

Table 10 Use of fertilizer in Sept. 1992/Aug. 1993

Type		Compound D	Compound X	Urea	Ammonium
Households		24	8	28	46
Sample		75	75	75	75
%		32.0	10.7	37.3	61.3
Purchased					
Quantity	(kg)	7,410	1,400	9,300	18,000
Average	(kg)	308.8	175.0	322.1	391.3
Applied					
Quantity	(kg)	7,335	1,400	9,100	12,950
Average	(kg)	305.6	175.0	325.0	281.5
Upland					
Quantity	(kg)	6,910	1,225	9,050	11,875
% in total		94.2	87.5	99.5	91.7
Households		24	8	28	42
Average	(kg)	287.9	153.1	323.2	282.7
Dambo					
Quantity	(kg)	425	175	50	1,075
% in total		5.8	12.5	0.5	8.3
Households		6	3	1	10
Average	(kg)	70.8	58.3	50.0	107.5

Table 9 shows the possession of livestock. Small livestock gives important protein of animal origin to the people in Chinena village, while cattle is very important as work animal and provider of organic manure. About 70 percent of the interviewed households has cattle (6.7 head per household), oxen are 60 percent (2.9 head per household).

4.4. Use of chemical fertilizer

It is noteworthy that many households have used modern input like chemical fertilizer for farming in Chinena village. Table 10 shows the use of chemical fertilizer. Four types of chemical fertilizer are used. About 30 ton of chemical fertilizer was applied in total last year. Among the four types of chemical fertilizer, ammonium fertilizer is used considerably in terms of both the applied quantity and the number of household. One of the features in the use of chemical fertilizer is that it was applied much more to the upland field than the dambo field. As mentioned already, vegetables are grown even in the upland field, but the crop to be applied chemical fertilizer is maize.

It seems that most of the farmers in Chinena village attach much importance to

growing maize from the point of chemical fertilizer used. The reason why chemical fertilizer is applied much more to maize on upland field will be due to the facts that maize is a basic staple food and the price is relatively stable than vegetables.

Plant nutritive elements are supplied not only by chemical fertilizer but also by manure which is made from animal dung in Chinena village. It is also assumed that use of manure relates to a relatively small quantity use of chemical fertilizer in dambo field.

I analyzed the relationship between the applied quantity of chemical fertilizer and the agricultural income in the same year. However the data showed no relationship between them.

4.5. Use of agricultural chemicals

Twenty types of agricultural chemicals were used in the interviewed farmers, as Table 11 shows. Solobar and Karate were applied to vegetables while they were bought from the institutional agricultural credit for cotton. A major portion of the agricultural chemicals were used for growing maize and vegetables on upland field.

4.6. Use of agricultural credit

As already mentioned, most of Chinena farmers used modern agricultural inputs like chemical fertilizer, agricultural chemicals and improved variety of maize. Does the fund to buy those inputs come from self-finance or institutional finance? Table 12 shows the number of cases of the institutional credit received by farmers in the past. Ten households received the institutional credit, in total 20 cases before 1992/93. This is only 13 percent of the 75 interviewed households.

Most of farmers bought modern inputs with their own money, not by institutional credit. The production of cash crops like vegetables give farmers an important agricultural income and the farming of dambo field during the dry season result in the use of such income for a modern inputs.

4.7. Employment of agricultural labor

Use of employed labor is one of the scale for measuring development of commercial agriculture. As already pointed out, commercialization of vegetables is common in Chinena village. Vegetable production is relatively labor intensive farming. If farming labor is scarce in such a farming, employed labors are needed.

One household employed a boy (14 years old) as a regular worker for the farming. In this case the employer is a traditional doctor as his side job, and the household of the boy was facing to the difficulty of living.

Table 13 shows the use of casual employed labor. 25 households of the 75 interviewed households employed casual labor during the last one year. 20 percent of the

Table 11 Use of pesticide in

Type	Decis	Karate	Rogoh	Solobar	Copper	Albrolium
Households	17	29	4	36	1	2
Sample	24	74	75	75	75	75
%	23.0%	38.7%	5.3%	48.0%	1.3%	2.7%
Purchased						
Quantity	12,500 cc	67 l	1,050 cc	46,000 g	1,000 g	3,000 cc
Average	735.3 cc	2.3 l	262.5 cc	1,277.8 g	1,000.0 g	1500.0 cc
Applied						
Quantity	11,250 cc	60.0 l	1,050 cc	43,250 g	1,000 g	3,000 cc
Average	661.8 cc	2.1 l	262.5 cc	1,201.4 g	1,000.0 g	1,500.0 cc
To Upland						
Quantity	7,000 cc	40.5 l	612.5 cc	30,875 g	1,000 g	1,500 cc
% in total	62.2%	67.5%	58.3%	71.4%	100.0%	50.0%
Households	15	24	3	31	1	1
Average	466.7 cc	1.7 l	204.2 cc	996.0 g	1000.0 g	1500.0 cc
To Dambo						
Quantity	4,250 cc	19.1 l	473.5 cc	12,375 g	0 g	1,500 cc
% in total	37.8%	32.5%	41.7%	28.6%	0.0%	50.0%
Households	8	16	2	14	0	1
Average	531.3 cc	1.2 l	218.8 cc	883.9 g	0.0 g	1500.0 cc

Table 12 Agricultural Loan in 75 farmers

Name of loan	Before 1992/93		In 1992/93		Total (cumulated)	
	No.	Household	No.	Household	No.	Household
LINTCO	6	6	6	6	12	12
CUSA	5	5	2	2	7	7
ZCF	1	1	1	1	2	2
LINA	5	3	1	1	6	4
AFC	2	2	0	0	2	2
CB	1	1	0	0	1	1
Total	20	18	10	10	30	28

households used the employed casual workers for weeding, and about 10 percent for ploughing and harvesting. These works were done for maize on upland and vegetables.

The method of payment to the workers was in cash and kind. A day's wage in cash is observed, but "Piece work" is a common type. In many cases, agricultural

Sept. 1992/Aug. 1993

Malathion	Thiodan	Indosaphen	Diathin	Braval	Primor
1	1	3	5	9	1
75	75	75	75	75	75
1.3%	1.3%	4.0%	6.7%	12.0%	1.3%
750 cc	1,500 cc	13 kg	7,000 g	28.0 l	500 g
750.0 cc	1,500.0 cc	4.3 kg	1,400.0 g	3.11 l	500.0 g
750 cc	1,500 c	13.0 kg	7,000 g	28.0 l	500 g
750.0 cc	1,500.0 cc	4.3 kg	1,400.0 g	3.11 l	500.0 g
750 cc	0 cc	8.5 kg	5,000 g	21.0 l	0 g
100.0%	0.0%	65.4%	71.4%	75.0%	0.0%
1	0	2	5	8	0
750.0 cc	0.0 cc	4.25 kg	1,000.0 g	2.63 l	0.0 g
0 cc	1,500 cc	4.5 kg	2,000 g	7.0 l	500 g
0.0%	100.0%	34.6%	28.6%	25.0%	100.0%
0	1	2	3	3	1
0.0 cc	1500.0 cc	2.25 kg	666.67 g	2.33 l	500.0 g

Table 13 Employment of agricultural laboure

(75 households)

	Kind of job	Household	%
1	Clearing	1	1.3
2	Ploughing	7	9.3
3	Cultivating	1	1.3
4	Transplanting	1	1.3
5	Weeding	15	20.0
6	Watering	2	2.7
7	Spraying	2	2.7
8	Harvesting	7	9.3
9	Shelling	1	1.3
10	Putting wire fence	1	1.3
11	Digging well	2	2.7
12	Grazing cattle	1	1.3

Table 14 Non-agricultural job by male and female head
(cumulated)

No.	Kind of job	Number
Full-time		
1	Teacher	2
2	Driver	2
3	Meat trader	1
4	Metalwork	1
Part-time		
1	Piece work on farm	7
2	Brewing and selling beer	4
3	Charocoal burning	1
4	Traditional doctor	1
5	Brick layer	1
6	Carpenter and blacksmith	1
7	Transportation by car	2
8	Mechanic	1
9	Kinitting and sewing	1
10	Selling salt	1
11	Selling cigarets	1
12	Selling fish	1
13	Selling tomatoes	2
14	Selling tomatoes and popcorn	1
15	Selling fish and cigarets	1
16	Selling cassava roots and cigarette	1
17	Selling tomatoes and watermelons	1
18	Cooking and selling Chikanda*	1

labors to be employed are looking for their jobs in Chinena village. Rather than labor shortage in employer, it seems that the people getting high income support the poor's livelihood. The employer gives farming job not only to the Chinena villagers, but also to the people from the outside. Primary-school children are also employed to get money by doing farming jobs. Wage per day depends on the kind of job, such as daily payment or piece work, but in many cases, it is 2,000 kwacha for adult man.

5 Non-agricultural job

5.1. Household head

As shown in Table 14, six household heads of 76 households have a fulltime non-agricultural job, two primary-school teachers, two drivers, one cattle dealer, and one

Table 15 Non-agricultural job by wife

(cumulated)

No.	Kind of job	Number
Part-time		
1	Brewing and selling beer	5
2	Brewing and selling sweet beer	1
3	Making and selling traditional bread	1
4	Kniting	1
5	Selling fish	2
6	Selling second-hand clothes	2
7	Selling cooking oil	3
8	Selling sugar	2
9	Selling soak	1

metalworker. But all of them are also farming as a part-time job.

31 household heads of 70 households, except six households who have a full-time non-agricultural job, have side-jobs. The most popular side-job was piece work. They have engaged in the piece work, not only in Chinena village, but also outside the village. In many cases household heads of low income have done piece work in the relatively high income households.

The second number of side-job was the brewing and selling of traditional local beer, "Chibuku". This kind of job is normally done by women. "Chibuku" is made from maize. Most of households make it a few times in a year. Selling "Chibuku" is a very important income source at home. "Chibuku" is sold in a cup, whose price is decided by the headmen of neighboring villages to be consulted among them, and fixed a whole year. The price is a controlled by local people. The major reason is to prevent troubles concerning the price.

Nine household heads were doing retail sale of consumer goods as a side-job. The consumer goods are a) the items which are brought into the village, such as salt, cigarette and dried fish, and b) the items which are farm products such as tomatoes, watermelons, popcorn, and so on. Retail sellers go to the places where goods are sold, and buy those goods. There is no any retail shop in Chinena village. Peddlers so often visit the villagers' house to sell clothes, breads, dried fish and so on. The villagers who grow vegetables on dambo fields have purchasing power, because they get cash income even in the dry season.

Motor-lorry is a very important vehicle in Chinena village. As already mentioned, only three men have cars, but two of them have already broken. One farmer who has the biggest farm in the village is the owner of the lorry and the transporter as a side business. He transports not only his farm products but also that

of villagers' to Lusaka, one of the biggest markets in Zambia.

He also transports commodities from the town into the village, and gets transport fee from the villagers. He can obtain higher prices of farm products in the city than in the village. The periodical transportation about twice per week by himself is very important to the villagers, because they can get information on prices from the outside. Without doing it, the farmers of Chinena village are only price takers when they sell farm products in the village to middlemen.

5.2. Household head's wife

Brewing and selling "Chibuku" is the most popular side-job by household head's wife, shown in Table 15. Selling consumer goods is done by wife as well as husband. These goods are used clothes, cooking oil, sugar and soap.

6 Conclusions

Three points are pointed out as conclusions, as follows.

a) Maize is a very important staple crop to the people of Chinena village. Although the soil fertility of upland fields are very low, the estimated harvest of maize exceeded considerably the required quantity for self-consumption in the 1992/93 crop year when it was a normal year in the rainfall.

b) Such a surplus production of maize would be realized as a result of both the use of chemical fertilizer and the good rainfall. Most of the farmers bought chemical fertilizer with their own money, which was gained from selling of vegetables grown on upland and dambo fields. However, no positive relationship between the size of agricultural income and the purchased quantity of chemical fertilizer was seen from the data. To analyze the relationship more accurately, we should apply one year time-lag methodology between data on the total income, which is added agricultural income to non-agricultural income, and the purchased quantity of chemical fertilizer.

c) Agricultural income gained by using upland and dambo fields, means that the income is got all through the year, which gives employment opportunity in both farming and non-farming, and expands the markets for production inputs and consumer goods.

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